

We claim:

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11. A process for hydrogenating a benzenepolycarboxylic acid or a derivative thereof or a mixture of two or more thereof by bringing the benzenepolycarboxylic acid or the derivative thereof or the mixture of two or more thereof into contact with a hydrogen-containing gas in the presence of a catalyst which comprises as active metal at least one metal of transition group VIII of the Periodic Table alone or together with at least one metal of transition group I or VII of the periodic table applied to a support which contains macropores having a pore diameter of greater than 50nm according to the definition in Pure Applied Chemistry 45, p. 79 (1976) with the proviso that
- 15 if dimethyl terephthalate is hydrogenated, the hydrogenation using a catalyst which comprises as active metal ruthenium either alone or together with at least one metal of transition group I, VII or VIII of the Periodic Table applied to a support, where the support has a mean pore diameter of at least 50 nm and a BET surface area of at most 30 m²/g and
- 20 the amount of the active metal is from 0.01 to 30% by weight, based on the total weight of the catalyst, and the ratio of the surface areas of the active metal and the catalyst support is less than 0.05,
- and/or
- 25 a catalyst which comprises as active metal ruthenium either alone or together with at least one metal of transition group I, VII or VIII of the Periodic Table in an amount of from 0.01 to 30% by weight, based on the total weight of the catalyst, applied to a support, where from 10 to 50% of the pore volume of the support is formed by macropores having a pore diameter in the range from 50 nm to 10,000 nm and from 50 to 90% of the pore volume of the support is formed by mesopores having a pore diameter in the range from 2 to 50 nm,
- 30 where the sum of the pore volumes adds up to 100%, is excluded.
12. A process as claimed in claim 1, wherein the catalyst comprises as active metal at least one metal of transition group VIII of the Periodic Table either alone or together with at least one metal of transition group I or IV of the Periodic Table applied to a support, where the
- 35 support has a mean pore diameter of at least 50 nm and a BET surface area of at most

- 5 30 m²/g and the amount of the active metal is from 0.01 to 30% by weight, based on the total weight of the catalyst.
13. A process as claimed in claim 1, wherein the catalyst comprises as active metal at least one metal of transition group VIII of the Periodic Table either alone or together with at least one
10 metal of transition group I or VII of the Periodic Table in an amount of from 0.01 to 30% by weight, based on the total weight of the catalyst, applied to a support, where from 10 to 50% of the pore volume of the support is formed by macropores having a pore diameter in the range from 50 nm to 10,000 nm and from 50 to 90% of the pore volume of the support is formed by mesopores having a pore diameter in the range from 2 to 50 nm, where the
15 sum of the pore volumes adds up to 100%.
14. A process as claimed in claim 1, wherein the catalyst comprises as active metal at least one metal of transition group VIII of the Periodic Table either alone or together with at least one
20 metal of transition group I or VII of the Periodic Table in an amount of from 0.01 to 30% by weight, based on the total weight of the catalyst, applied to a support, where the support has a mean pore diameter of at least 0.1 μ m and a BET surface area of at most 15 m²/g.
15. A process as claimed in claim 1, wherein the benzenepolycarboxylic acid or the derivative thereof is selected from the group consisting of monoalkyl and dialkyl esters of phthalic acid, terephthalic acid and isophthalic acid, monoalkyl, dialkyl and trialkyl esters of
25 trimellitic acid, trimesic acid and hemimellitic acid, monoalkyl, dialkyl, trialkyl and tetraalkyl esters of pyromellitic acid, where the alkyl groups can be linear or branched and each have from 3 to 18 carbon atoms, anhydrides of phthalic acid, trimellitic acid and hemimellitic acid, pyromellitic dianhydride and mixtures of two or more thereof.
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16. A process as claimed in claim 2, wherein the benzenepolycarboxylic acid or the derivative thereof is selected from the group consisting of monoalkyl and dialkyl esters of phthalic acid, terephthalic acid and isophthalic acid, monoalkyl, dialkyl and trialkyl esters of
35 trimellitic acid, trimesic acid and hemimellitic acid, monoalkyl, dialkyl, trialkyl and tetraalkyl esters of pyromellitic acid, where the alkyl groups can be linear or branched and

- 5 each have from 3 to 18 carbon atoms, anhydrides of phthalic acid, trimellitic acid and hemimellitic acid, pyromellitic dianhydride and mixtures of two or more thereof.
17. A process as claimed in claim 3, wherein the benzenepolycarboxylic acid or the derivative thereof is selected from the group consisting of monoalkyl and dialkyl esters of phthalic acid, terephthalic acid and isophthalic acid, monoalkyl, dialkyl and trialkyl esters of trimellitic acid, trimesic acid and hemimellitic acid, monoalkyl, dialkyl, trialkyl and tetraalkyl esters of pyromellitic acid, where the alkyl groups can be linear or branched and each have from 3 to 18 carbon atoms, anhydrides of phthalic acid, trimellitic acid and hemimellitic acid, pyromellitic dianhydride and mixtures of two or more thereof.
18. A process as claimed in claim 5, wherein the benzenepolycarboxylic acid or the derivative thereof is selected from the group consisting of monoalkyl and dialkyl esters of phthalic acid, terephthalic acid and isophthalic acid, monoalkyl, dialkyl and trialkyl esters of trimellitic acid, trimesic acid and hemimellitic acid, monoalkyl, dialkyl, trialkyl and tetraalkyl esters of pyromellitic acid, where the alkyl groups can be linear or branched and each have from 3 to 18 carbon atoms, anhydrides of phthalic acid, trimellitic acid and hemimellitic acid, pyromellitic dianhydride and mixtures of two or more thereof.
19. A process as claimed in claim 1, wherein the support comprises activated carbon, silicon carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium oxide, zinc oxide or a mixture of two or more thereof.
20. A process as claimed in claim 2, wherein the support comprises activated carbon, silicon carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium oxide, zinc oxide or a mixture of two or more thereof.
21. A process as claimed in claim 3, wherein the support comprises activated carbon, silicon carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium oxide, zinc oxide or a mixture of two or more thereof.

- 5 22. A process as claimed in claim 4, wherein the support comprises activated carbon, silicon
carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium
oxide, zinc oxide or a mixture of two or more thereof.
- 10 23. A process as claimed in claim 1, wherein the hydrogenation is carried out in the presence of
a solvent or diluent.
24. Method of using a cyclohexanedicarboxylic ester according to claim 2 or a
cyclohexanetricarboxylic ester or a mixture of two or more thereof as plasticizer in plastics.
- 15 25. Method of using a cyclohexanedicarboxylic ester according to claim 3 or a
cyclohexanetricarboxylic ester or a mixture of two or more thereof as plasticizer in plastics.
26. Method of using a cyclohexanedicarboxylic ester according to claim 4 or a
cyclohexanetricarboxylic ester or a mixture of two or more thereof as plasticizer in plastics.
- 20 27. A process as claimed in any of the preceding claims, wherein the hydrogenation is carried
out continuously.
28. A process as claimed in claim 2, wherein the support comprises activated carbon, silicon
carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium
oxide, zinc oxide or a mixture of two or more thereof.
- 25 29. A process as claimed in claim 3, wherein the support comprises activated carbon, silicon
carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium
oxide, zinc oxide or a mixture of two or more thereof.
- 30 30. A process as claimed in claim 4, wherein the support comprises activated carbon, silicon
carbide, aluminum oxide, silicon dioxide, titanium dioxide, zirconium dioxide, magnesium
oxide, zinc oxide or a mixture of two or more thereof. --

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macropores: pores whose diameter is above 50nm or whose diameter is from 2nm and 50nm (mesopores) → macropores

We claim:

(phthalic acid, isophthalic acid, terephthalic acid, terephthalic acid, trimellitic acid, trimellitic acid, hemimellitic acid, pyromellitic acid,

11. A process for hydrogenating a benzenepolycarboxylic acid or a derivative thereof or a mixture of two or more thereof by bringing the benzenepolycarboxylic acid or the derivative thereof or the mixture of two or more thereof into contact with a hydrogen-containing gas in the presence of a catalyst which comprises as active metal at least one metal of transition group VIII of the Periodic Table alone or together with at least one metal of transition group I or VII of the periodic table applied to a support which contains macropores having a pore diameter of greater than 50nm according to the definition in Pure Applied Chemistry 45, p. 79 (1976) with the proviso that

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mono ester,
di ester,
alkyl ester
and anhydride

- if dimethyl terephthalate is hydrogenated, the hydrogenation using a catalyst which comprises as active metal ruthenium either alone or together with at least one metal of transition group I, VII or VIII of the Periodic Table applied to a support, where the support has a mean pore diameter of at least 50 nm and a BET surface area of at most 30 m²/g and the amount of the active metal is from 0.01 to 30% by weight, based on the total weight of the catalyst, and the ratio of the surface areas of the active metal and the catalyst support is less than 0.05,

and/or

- a catalyst which comprises as active metal ruthenium either alone or together with at least one metal of transition group I, VII or VIII of the Periodic Table in an amount of from 0.01 to 30% by weight, based on the total weight of the catalyst, applied to a support, where from 10 to 50% of the pore volume of the support is formed by macropores having a pore diameter in the range from 50 nm to 10,000 nm and from 50 to 90% of the pore volume of the support is formed by mesopores having a pore diameter in the range from 2 to 50 nm, where the sum of the pore volumes adds up to 100%, is excluded.

12. A process as claimed in claim 1, wherein the catalyst comprises as active metal at least one metal of transition group VIII of the Periodic Table either alone or together with at least one metal of transition group I or IV of the Periodic Table applied to a support, where the support has a mean pore diameter of at least 50 nm and a BET surface area of at most